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OPERATIONS MANUAL ELEMENT FILE UPDATE.(U)
DEC 78 W J TAYLOR
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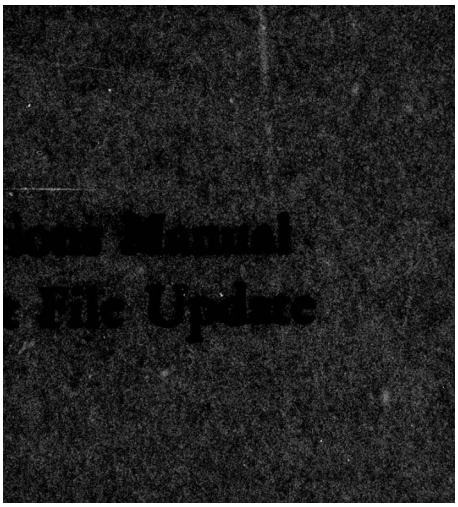

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
LINCOLN LABORATORY

OPERATIONS MANUAL ELEMENT FILE UPDATE

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Group 94

PROJECT REPORT ETS-40

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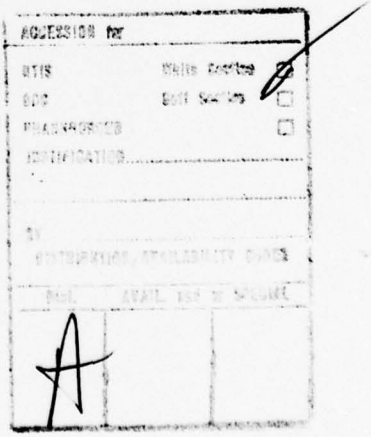
LEXINGTON MASSACHUSETTS

ABSTRACT

The Element File Update program is an interactive editor for the non-orbital Master Element File data. Presented here are a program overview, specific operating instructions and special user and programmer notes.



CONTENTS

I. OVERVIEW

Element File Update (ELUP) is an interactive editor for the Master Element File (MEF) data. The Element File Maintenance (EFM) task processes routine orbital element set updates. Non-routine orbital element set editing is processed by the interactive satellite ephemeris processor SAT. ELUP maintains the remainder of the MEF record described in Table 1.

The MEF is the storage location of not only the orbital element set data, but also descriptors, both narrative and numeric, of the satellite and its tracking history. It provides a single control point for satellite data. The file is in two parts: a directory called the Master Index File (MIF) contains a tabulation of the satellite numbers and the record numbers containing the MEF data; and the MEF, containing the actual data as shown in Table 1. Up to 1000 satellite entries may be kept on the MEF.

Additional capabilities include: renumbering satellite records; replacing the "current" orbital element set for a given satellite by the previous, or "old" set. This is the only program in the ETS system which can delete satellite records from the MEF.

TABLE 1

STRUCTURE OF A MASTER ELEMENT FILE (MEF) RECORD

- Satellite Number
- Security Classification
- Narrative Tag
- National Origin
- Spin Vector
- Reflectivity-Area Product
- Descriptors
- Observed Offsets
- Current Orbital Element Set*
- Previous Orbital Element Set*

*Not editable, except for the element set number of the current set.

II. OPERATION

The program is activated from the computer operator's console by typing:

/ELUP/ACT,,TM

It erases the CRT screen at the user's terminal, writes its name, version ID and the current day/date/time on the screen, writes a prompting question mark and awaits user input.

III. COMMAND STRUCTURE

ELUP is command structured with free format input. All commands may be abbreviated by their first three characters. Characters after the third are ignored. Fifteen commands are available. For most commands the arguments may either be typed on the same line as the command or entered separately. The TAG and METric commands require some special attention, as will be discussed below.

The form of a typical command line is:

```
COM argl,...,argn
```

As noted above, the command field "COM" in this example, must be at least three characters long. The arguments may be separated by a comma, an equal sign, a slash, or one or more spaces. A space cannot be used in conjunction with any of the other separators because the system interprets this as a null (zero) argument. Table 2 tabulates the commands and gives a synopsis of their use.

TABLE 2

COMMANDS OF ELUP

INITIALIZATION	EDITING	EXECUTION	DESCRIPTION
DISplay <sat<#rec>>			display one or more records on the output device
EDIt <sat>			retrieve list and bring under edit a sat record
FINd <string1,...,stringn>			retrieve list and bring under edit the sat record containing the input string
OUTput <unit>			list or change the output display unit
COMmands			list the set of available command abbreviations
	METric		enter editing of metric data
	TAG <narrative>		edit narrative tag
	ORIgin <nation>		edit national origin
	OFFsets <t, $\Delta\alpha$, $\Delta\delta$, Δt>		enter edit observed offsets
	CLAssification <UCS>		edit security classification field
		DELete sat	delete a satellite record from MEF
		PULl sat	pull up (old) elements from push-down stack
		NUMber <old#,new#>	change the satellite number
		STAtus	list current # of occupied records
		EXIt	exit the program

IV. COMMANDS

The most common use of the program is to edit the MEF record for a given satellite. Before editing can begin, the MEF record for that satellite must be fetched from disk. Three commands will fetch the MEF record. These are DISplay, EDIt and FINd. The principal difference between DISplay and EDIt is that the former lists the record(s) fetched on the current output device, while the latter lists the record fetched on the CRT terminal. The FINd command helps you locate a satellite whose tag (name) you remember but whose number you can't recall.

When editing any piece of data (where the data is <u>not</u> typed on the same line as the command), typing $$ causes the current transaction to be terminated without affecting the MEF record. Whether the data is entered on the command line or separately any piece of data you do <u>not</u> wish to change can be protected by typing an asterisk (*) in its position in the argument list.

In the command description below, required inputs are in upper case; optional inputs and argument paraforms are in lower case; optional arguments are enclosed in left and right carets. Figure 1 shows the MEF record listing format generated by the program. Note that the second record was deleted during the operating session.

A. Displaying MEF Records

DISplay <sat <#rec>>

<u>Sat</u> is the optional (first) satellite number to be listed

<u>#rec</u> is the optional number of records to be listed

```
                E L E M E N T   F I L E   U P D A T E   4.1
      DAY 324,     20 NOV 78   10:41

78066  D     ROCKET BODY OF COSMOS 1024
USSR RHO*A=  1.00 SPIN=   0.00   0.00   0.00 REC.#  79
CYLINDER                    NOT MANEUVERABLE        1
   LAST OFFSETS: T=  0.00 &RA=   0.00 &DEC=   0.00 &T=   0.00 MIN.
1 10998U 78066  D 78305.22164658 -.00001118                          12
2 10998  62.8488 251.8013 7332425 319.5754   4.5140  1.99971050
1 10998U 78066  D 78283.71894066 -.00000117                          10
2 10998  62.8380 254.9107 7340348 319.3161   4.2806  1.99982788

             **** SAT.# 95002.0 DELETED ****

IONU      STAL
    RHO*A=  1.00 SPIN=   0.00   0.00   0.00 REC.#  463
                                                    0
CURRENT OFFSETS: T=  0.00 &RA=   0.00 &DEC=   0.00 &T=   0.00 MIN.
1 95002U  IONU     78242.83133137 0.00000000                          0
2 94002   4.1480  70.6543 0167886 214.3001 248.2377 1.01620010
1 95002U  IONU     78320.04166666 0.00000000                          0
2 95002  63.3042 147.6737 6963997 279.7500 344.4238 2.00507706
```

Fig.1. MEF records displayed by ELUP.

If no arguments are input the current record is displayed.

If sat = 1, display the next record.

If sat = -1, display the first record.

0< #rec < 100

Records are displayed on the current OUTput device. The (last) record displayed is available for editing.

B. Editing by Satellite Number

EDIt <sat>

SAT is the optional satellite number to be edited.

Conventions for sat are the same as for DISplay.

If sat is specified, the MEF record retrieved is displayed on the CRT screen.

C. Finding Satellite Record by Tag

FINd stringl...stringn

stringl...stringn are four-character strings to be located consecutively and exactly in a satellite tag. Searching begins at the next record on the MEF. If an ASCII field exceeds 4 characters, only the first four are checked. Numeric fields of the tag are compared for numeric equality. The record found is available for editing.

D. Specifying the Output Display Device

OUTput <unit>

unit = ADD<s> for the CRT screen

= LP for the printer file

= TY for the console teletype

If no argument is input the current output device name is listed.

E. Listing the Command Abbreviations

COMmands

The listing is on the CRT screen.

F. Editing the Metric (Numeric) Data

METric

Issuing this command causes the program to enter a two-stage edit of the ancillary numeric data in the current MEF record. Editing conventions are described above.

Stage 1 edits the reflectivity-area product (RHO*A), the spin vector (dimensioned 3) and the element set number. The current data is listed before new data is requested. RHO*A must be greater than zero. (It is area times reflectivity.) The spin components are right ascension, declination of the spin axis and the angle between the spin axis and the axis of symmetry (all in degrees).

Stage 2 edits the descriptor information. Table 3 presents the set of descriptor values which are currently assigned. This admittedly complicated-to-remember structure is written on the screen before the data is requested. Editing conventions are described above.

G. Editing the Narrative Tag

TAG <narrative>

If narrative is specified on the command line, it must begin in column 5. If it is not specified on the command line, the current tag is listed and the narrative tag prompted. The tag should begin in Column 1. The first 8 characters of the tag are the international name. They are write protected.

TABLE 3

DESCRIPTOR ASSIGNMENTS

Word 1 - Shape	Word 2 - Status	Word 3 - Update
0 unknown	0 unknown	0 observed on current elements
1 flat plate	1 not capable of maneuver	1 new SDC elements since observed
2 cylinder	2 capable of maneuver	>1 # times propagated (+1)
3 sphere	3 not tasked for ETS observation	
4 3-axis stabilized		

H. National Origin

ORIgin <nation>

nation is the four character ASCII code for the nation of origin of the satellite.

If no argument is input the current national origin is listed and the new data prompted.

I. Observed Offsets

OFFsets <day, ra, dec, time>

day is the floating point day (and fraction) of the last observation

ra is the offset right ascension (degrees)

dec is the offset declination (degrees)

time is the offset time (minutes) along orbit

J. Security Classification

CLAssification <UCS>

UCS = U for unclassified elements

C for confidential elements

S for secret elements

K. Deleting Satellite Records

DELete sat

sat is removed from the index file and its MEF record purged. The file is compressed and resequenced automatically at program termination. See the User Notes for details. A message and historical listing of the record being deleted is sent to the printer file.

L. Recovering Previous Element Set

PULl sat

The "old" element set in the two set stack is written over "current" element set. This is typically done when the new set is determined to be invalid, for some reason. If no "old" set exists an error message is generated.

M. Re-numbering an MEF Record

NUMber old#, new#

old# is the number of the satellite on the MEF whose satellite number is to be changed.

new# is the number to which it is to be changed.

This feature can be used to correct index file or data entries which do not match, renumber analyst-generated records, or to protect records from being over-written by incoming orbital element set updates.

N. Listing the Number of Objects on File

STAtus

This lists on the CRT screen the number of occupied MEF records.

O. Program Termination

EXIt

V. USER NOTES

A. Editing

Editing of an MEF record is on a continuous update basis. Each edited piece of data is placed in the element set record and re-written to the MEF. Thus, if the program should abnormally cease execution nearly all the editing, except perhaps the last piece of data, would be up to date.

B. Special Processing

If a NUMber request is received, the program will rewrite the index file to disk at termination time. If a DELete request is received, the index file is rewritten and the Element File Resequence program MEF is run as an overlay to compress and resequence the MEF.

C. Admonitions

The three commands of execution DELete, PUL1 and NUMber are not to be taken lightly. Deletions are immediate and non-recoverable. PUL1s overwrite the current orbital elements and are non-recoverable. NUMber can cause an element set to be hidden in that no one except the originator will know where the satellite data is stored. These commands should only be used by experienced orbital analyst personnel.

VI. PROGRAMMER NOTES

Logical file 11 is used by the MEF resequence overlay as a scratch area for the compress and resequence process. MEF is executed as a chain overlay, replacing ELUP's code with its own.

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

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